UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/880,193	06/13/2001	Koichi Aikawa	0941.65619	6151

7590 04/15/2004

EXAMINER
TZENG, FRED

ART UNIT	PAPER NUMBER
2651	

DATE MAILED: 04/15/2004

Patrick G. Burns, Esq.
GREER, BURNS & CRAIN, LTD.
Suite 2500
300 South Wacker Dr.
Chicago, IL 60606

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/880,193	Applicant(s) AIKAWA ET AL.	
	Examiner Fred Tzeng	Art Unit 2651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-19 are presented for examination.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on February 15, 2001. It is noted, however, that applicant has not filed a certified copy of the Japan 2001-039249 application as required by 35 U.S.C. 119(b).

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

4. Claim 12 recites the limitation "...the steps..." in line 5. There is insufficient antecedent basis for this limitation in the claim.

5. Claim 13 recites the limitation "...the step..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 14 recites the limitation "...the steps..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 15 recites the limitation "...the steps..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 16 recites the limitation "...the steps..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 17 recites the limitation "...the step.." in line 2. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 18 recites the limitation "...the step..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

11. Claim 19 recites the limitation "...the step..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1, 2, 8, 9, 12, 13, 16 and 17 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Hamada et al (USPN 5,402,400), hereafter as Hamada.

Regarding claim 1, Hamada discloses a disk device (see column 8 lines 44-46) comprising: a disk having predetermined information sectors recorded at a constant

interval (see column 8 lines 49-50 and column 16 lines 44-45, 60-65 and figure 13); a head scanning the disk (see column 8 lines 52-53 or column 16 lines 44-45 or column 5 lines 38-41); and a disturbance-compensation unit obtaining an amount of a disturbance based on a time-interval measurement in reading the predetermined information sectors so as to compensate a position of the head according to the amount of the disturbance (see column 5 lines 45-61).

Regarding claim 2, Hamada discloses that the disturbance compensation unit compensates a tracking error signal according to the amount of the disturbance, the tracking error signal corresponding to a positional error of the head on the disk (see column 5 lines 49-61 and column 8 lines 52-56 or column 9 lines 12-30).

Regarding claim 8, Hamada discloses a repeatable run-out amount obtaining unit obtaining a repeatable run-out amount of the head in relation to the disk so as to adjust the amount of the disturbance by the repeatable run-out amount (see column 5 lines 49-54).

Regarding claim 9, Hamada discloses the repeatable run-out amount obtaining unit obtains the repeatable run-out amount by preliminarily detecting a deviation amount of the head affected by few disturbance, the head deviating from a track of the disk by the deviation amount (see column 5 lines 49-54).

Regarding claim 12, Hamada discloses a disturbance compensation method for a disk device including a disk having predetermined information sectors recorded at a constant interval (see column 5 lines 38-43, 45-61 and column 16 lines 60-65 and figure 13), and a head scanning the disk (see column 16 lines 44-50), the method comprising:

steps of: obtaining an amount of a disturbance based on a time-interval measurement in reading the predetermined information sectors (see column 16 lines 44-50); and compensating a position of the head according to the amount of the disturbance (see column 5 lines 45-61 or column 9 lines 12-30).

Regarding claim 13, Hamada discloses a step of compensating a tracking error signal according to the amount of the disturbance, the tracking error signal corresponding to a positional error of the head on the disk (see column 9 lines 12-30).

Regarding claim 16, Hamada discloses steps of: obtaining a repeatable run-out amount of the head in relation to the disk; and adjusting the amount of the disturbance by the repeatable run-out amount (see column 5 lines 49-54).

Regarding claim 17, Hamada discloses a step of preliminarily detecting a deviation amount of the head affected by few disturbances, the head deviating from a track of the disk by the deviation amount, so as to obtain the repeatable run-out amount (see column 5 lines 49-54).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 3-7, 14 and 15 rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al (USPN 5,402,400) in view of Sidman et al (USPN 5,426,545), hereafter as Sidman.

Regarding claims 3 and 14, Hamada discloses the invention substantially as claimed. Hamada discloses a disk device (see column 8 lines 44-46) comprising: a disk having predetermined information sectors recorded at a constant interval (see column 8 lines 49-50 and column 16 lines 44-45, 60-65 and figure 13); a head scanning the disk (see column 8 lines 52-53 or column 16 lines 44-45 or column 5 lines 38-41); and a disturbance-compensation unit obtaining an amount of a disturbance based on a time-interval measurement in reading the predetermined information sectors so as to compensate a position of the head according to the amount of the disturbance (see column 5 lines 45-61).

However, Hamada does not disclose that the disturbance-compensation unit including an angular-acceleration calculating unit calculating a rotational angular acceleration of a motor based on the time-interval measurement, the motor rotating the disk; and a disturbance-compensation amount calculating unit calculating a disturbance-compensation amount based on the rotational angular acceleration so as to compensate the position of the head according to the disturbance-compensation amount.

Sidman teaches a servo disturbance compensation system including an angular acceleration sensor for direct, broadband measurement of HDA angular acceleration in the direction of actuator rotation, wherein the angular acceleration sensor provides an

acceleration feedback signal which arguments existing feedback control signals for determining actuator current. In this way, the servo disturbance compensation system modifies the actuator assembly response to HDA shock and vibration during seek or track positioning operations for minimizing tracking errors (see column 2 lines 40-50).

Hamada and Sidman are combinable because they are from the same field of endeavor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Sidman's angular acceleration sensor for measuring or calculating the angular acceleration of the actuator rotation into Hamada's external disturbance suppressing/eliminating system in order to increase the sensitivity of the servo system to shock, vibration and windup (see column 2 lines 30-34 of Sidman specification) and improving a disk drive's disturbance compensation ability. Because Sidman's angular acceleration sensor for measuring or calculating the angular acceleration of the actuator rotation can enhance a disk drive's performance for minimizing tracking errors due to the disturbances, such as the shocks and vibrations (see column 2 lines 46-50 of Sidman's specification).

Regarding claim 4, Sidman discloses that the disturbance-compensation unit further includes a filter filtering a value of the rotational angular acceleration including a vibration of the disturbance so as to supply the value to the disturbance-compensation amount calculating unit (see column 3 lines 6-17).

Regarding claims 5 and 15, Hamada discloses the invention substantially as claimed. Hamada discloses a disk device (see column 8 lines 44-46) comprising: a disk having predetermined information sectors recorded at a constant interval (see

column 8 lines 49-50 and column 16 lines 44-45, 60-65 and figure 13); a head scanning the disk (see column 8 lines 52-53 or column 16 lines 44-45 or column 5 lines 38-41); and a disturbance-compensation unit obtaining an amount of a disturbance based on a time-interval measurement in reading the predetermined information sectors so as to compensate a position of the head according to the amount of the disturbance (see column 5 lines 45-61).

However, Hamada does not disclose that the disturbance-compensation unit includes an angular-velocity calculating unit calculating a rotational angular velocity of a motor based on the time-interval measurement, the motor rotating the disk; an angular-acceleration calculating unit calculating a rotational angular acceleration of the motor based on the rotational angular velocity; and a disturbance-compensation amount calculating unit calculating a disturbance-compensation amount based on the rotational angular acceleration so as to compensate the position of the head according to the disturbance-compensation amount.

Sidman teaches that a standard disk drive head positioning servo system provides feedback control signals related to the relative angular velocity of the actuator and also providing an error signal indicative of relative angular velocity (see column 2 lines 51-56) as well as the angular accelerometer sensing angular acceleration of the HDA caused by spindle imbalance forces, external shock and vibration, and self-induced HDA shock mount resonance excitation typically caused by seek activity (see column 2 lines 57-68), all for the purpose of minimizing the tracking errors in the head positioning servo system due to these disturbances (see column 3 lines 1-5).

Hamada and Sidman are combinable as they are from the same field of endeavor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Sidman's angular velocity calculating means and the angular accelerometer sensing angular acceleration of the HDA into Hamada's external disturbance suppressing/eliminating system in order to increase the sensitivity of the servo positioning system to shock, vibration and windup (see column 2 lines 30-34 of Sidman specification) and improving a disk drive's disturbance compensation ability. Because Sidman's angular velocity calculating means and the angular accelerometer sensing angular acceleration of the HDA can all enhance a disk drive's performance for minimizing tracking errors due to the disturbances, such as the shocks and vibrations (see column 2 lines 46-50 of Sidman's specification).

Regarding claim 6, Hamada discloses that the disturbance-compensation unit further includes a filter filtering a value of the rotational angular velocity including a vibration of the disturbance so as to supply the value to the angular-acceleration calculating unit (see column 7 lines 29-43).

Regarding claim 7, Sidman discloses that the angular-acceleration calculating unit is composed of a differential filter (see column 5 lines 40-41).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. Claims 10, 11, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al (USPN 5,402,400) in view of Smith et al (USPN 6,678,108) hereafter as Smith.

Regarding claims 10 and 18, Hamada discloses the invention substantially as claimed. Hamada discloses a disk device (see column 8 lines 44-46) comprising: a disk having predetermined information sectors recorded at a constant interval (see column 8 lines 49-50 and column 16 lines 44-45, 60-65 and figure 13); a head scanning the disk (see column 8 lines 52-53 or column 16 lines 44-45 or column 5 lines 38-41); and a disturbance-compensation unit obtaining an amount of a disturbance based on a time-interval measurement in reading the predetermined information sectors so as to compensate a position of the head according to the amount of the disturbance (see column 5 lines 45-61), wherein the disturbance-compensation unit includes repeatable run-out amount obtaining unit obtaining a repeatable run-out amount of the head in relation to the disk so as to adjust the amount of the disturbance by the repeatable run-out amount (see column 5 lines 49-54).

However, Hamada does not disclose that the repeatable run-out amount obtaining unit calculates an average of repeatable run-out amounts of the head measured at a plurality of points on the disk so as to adjust the amount of the disturbance by the average.

Smith teaches a method and apparatus for measuring and identifying position error signals from a plurality of sectors of a predefined cylinder for a plurality of disk

surfaces (see column 2 lines 1-6) and for each of plurality of disk surfaces, a repeatable runout (RRO) of the PES is computed for the defined number of revolutions (see column 2 lines 6-8), then a mean or average repeatable runout (MRRO) for the plurality of disk surfaces is computed (see column 2 lines 10-12 and column 3 lines 50-52).

Hamada and Smith are combinable because they are from the same field of endeavor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Smith's method and apparatus for measuring repeatable runout at a plurality of points on a disk and compute the average or mean of the repeatable runout amount into Hamada's external disturbance suppressing/eliminating system in order to increase the sensitivity of the servo positioning system to shocks, vibrations and improving a disk drive's disturbance compensation ability. Because Smith's method and apparatus can identify spindle imbalance in a hard drive with higher accuracy which is helpful for a disk drive's external disturbance-compensation purpose.

Regarding claims 11 and 19, Hamada discloses the invention substantially as claimed. Hamada discloses a disk device (see column 8 lines 44-46) comprising: a disk having predetermined information sectors recorded at a constant interval (see column 8 lines 49-50 and column 16 lines 44-45, 60-65 and figure 13); a head scanning the disk (see column 8 lines 52-53 or column 16 lines 44-45 or column 5 lines 38-41); and a disturbance-compensation unit obtaining an amount of a disturbance based on a time-interval measurement in reading the predetermined information sectors so as to compensate a position of the head according to the amount of the disturbance (see

column 5 lines 45-61), wherein the disturbance-compensation unit includes repeatable run-out amount obtaining unit obtaining a repeatable run-out amount of the head in relation to the disk and adjusting the amount of the disturbance by the repeatable run-out amount (see column 5 lines 49-54).

However, Hamada does not disclose that the repeatable run-out amount obtaining unit divides the disk into a plurality of zones so as to obtain the repeatable run-out amount in each of the zones.

Smith teaches a method and apparatus for receiving a position error signal from a plurality of sectors of a predefined cylinder for a plurality of disk surfaces (i.e., different zones) (see column 2 lines 1-6) for identifying spindle imbalance in a disk drive (see column 2 lines 1-2).

Hamada and Smith are combinable because they are from the same field of endeavor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate Smith's method and apparatus for receiving a position error signal from a plurality of sectors of a predefined cylinder for a plurality of disk surfaces (i.e., different zones) (see column 2 lines 1-6) for identifying spindle imbalance in a disk drive (see column 2 lines 1-2) into Hamada's external disturbance suppressing/eliminating system in order to increase the sensitivity of the servo positioning system to shocks, vibrations and improving a disk drive's disturbance compensation ability. Because Smith's method and apparatus can identify spindle imbalance in a hard drive with higher accuracy which is helpful for a disk drive's external disturbance-compensation purpose.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

19. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 308-9051, (formal communications, please mark "EXPEDITED PROCEDURE")

Or:

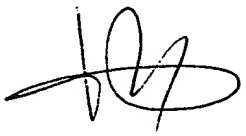
(703) 308-6606 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. V.A., Sixth Floor (receptionist).

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Tzeng whose telephone number is 703-305-4841. The examiner can normally be reached on weekdays from 9:30 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on 703-308-4825. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-746-5710 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.



Fred F. Tzeng

April 13, 2004